CLAIMS

1. A method for synthesizing a 2'-O-silyl-nucleoside phosphoramidite, comprising:

    a) introducing a 5',3'-cyclic silyl protecting group to a nucleoside ;

    b) introducing a 2'-O-silyl protecting group to the product from (a);

    c) introducing nucleic acid base protection if necessary to the product from (b);

    d) selectively desilylating the product from (c);

    e) introducing a 5'-hydroxyl protecting group to the product from (d); and

    f) introducing a phosphoramidite moiety at the 3'-position of the product from (e) to yield said 2'-O-silyl-nucleoside phosphoramidite.

2. A method for synthesizing a 2'-O-silyl-nucleoside phosphoramidite, comprising:

    a) introducing nucleic acid base protection if necessary to a nucleoside;

    b) introducing a 5',3'-cyclic silyl protecting group to the product from (a);

    c) introducing a 2'-O-silyl protecting group to the product from (b);

    d) selectively desilylating the product from (c);

    e) introducing a 5'-hydroxyl protecting group to the product from (d); and

    f) introducing a phosphoramidite moiety at the 3'-position of the product from (e) to yield said 2'-O-silyl-nucleoside phosphoramidite.

3. The method of claim 1, wherein said 5',3'-cyclic silyl protecting group is a 5',3'-O-(di-alkylsilanediyl) group.

4. The method of claim 2, wherein said 5',3'-cyclic silyl protecting group is a 5',3'-O-(di-alkylsilanediyl) group.

5. The method of claim 3, wherein said 5',3'-O-(di-alkylsilanediyl) group is a 5',3'-O-di-tert-butylsilanediyl group.

6. The method of claim 4, wherein said 5',3'-O-(di-alkylsilanediyl) group is a 5',3'-O-di-tert-butylsilanediyl group.

7. The method of claim 1, wherein said 2'-O-silyl protecting group is a 2'-O-tert-butyldimethylsilyl group.

8. The method of claim 2, wherein said 2'-O-silyl protecting group is a 2'-O-tert-butyldimethylsilyl group.

9. The method of claim 1, wherein said 2'-O-silyl protecting group is a 2'-O-triisopropylsilyloxymethyl group.

10. The method of claim 2, wherein said 2'-O-silyl protecting group is a 2'-O-triisopropylsilyloxymethyl group.

11. The method of claim 1, wherein the selective desilylation takes place in the presence of hydrogen fluoride-pyridine.

12. The method of claim 2, wherein the selective desilylation takes place in the presence of hydrogen fluoride-pyridine.

13. The method of claim 1, wherein said 5'-hydroxyl protecting group is dimethoxytrityl or monomethoxytrityl.

14. The method of claim 2, wherein said 5'-hydroxyl protecting group is dimethoxytrityl or monomethoxytrityl.

15. The method of claim 1, wherein said phosphoramidite moiety is a 3'-O-(2-cyanoethyl-N,N-diisopropylphosphoramidite) moiety.

16. The method of claim 2, wherein said phosphoramidite moiety is a 3'-O-(2-cyanoethyl-N,N-diisopropylphosphoramidite) moiety.

17. The method of claim 1, wherein said 2'-O-silyl-nucleoside phosphoramidite is a 2'-O-silyl-L-ribofuranosyl nucleoside phosphoramidite.

18. The method of claim 2, wherein said 2'-O-silyl-nucleoside phosphoramidite is a 2'-O-silyl-L-ribofuranosyl nucleoside phosphoramidite.

19. The method of claim 1, wherein said 2'-O-silyl-nucleoside phosphoramidite is a 2'-O-silyl-arabinofuranosyl-nucleoside phosphoramidite.

20. The method of claim 2, wherein said 2'-O-silyl-nucleoside phosphoramidite is a 2'-O-silyl-arabinofuranosyl-nucleoside phosphoramidite.

21. The method of claim 19, wherein said 2'-O-silyl-arabinofuranosyl-nucleoside phosphoramidite is a 2'-O-silyl-arabinofuranosyl-L-nucleoside phosphoramidite.

22. The method of claim 20, wherein said 2'-O-silyl-arabinofuranosyl-nucleoside phosphoramidite is a 2'-O-silyl-arabinofuranosyl-L-nucleoside phosphoramidite.

23. The method of claim 1, wherein said nucleic acid base protection is a protecting group selected from the group consisting of acetyl, benzoyl, isobutyryl, phenoxyacetyl, phenylacetyl, tert-butylphenoxyacetyl, tert-butylbenzoyl, and dimethylformamidine.

24. The method of claim 2, wherein said nucleic acid base protection is a protecting group selected from the group consisting of acetyl, benzoyl, isobutyryl, phenoxyacetyl, phenylacetyl, tert-butylphenoxyacetyl, tert-butylbenzoyl, and dimethylformamidine.

25. The method of claim 1, wherein said nucleoside is selected from the group consisting of cytidine, uridine, adenosine, guanosine, inosine, L-cytidine, L-uridine, L-adenosine, L-guanosine, L-inosine, arabino-cytidine, arabino-uridine, arabino-adenosine, arabino-guanosine, arabino-inosine, L-arabino-cytidine, L-arabino-uridine, L-arabino-adenosine, L-arabino-guanosine, L-arabino-inosine, ribo-thymidine, arabino-thymidine, L-ribo-thymidine, and L-arabino-thymidine.

26. The method of claim 2, wherein said nucleoside is selected from the group consisting of cytidine, uridine, adenosine, guanosine, inosine, L-cytidine, L-uridine, L-adenosine, L-guanosine, L-inosine, arabino-cytidine, arabino-uridine, arabino-adenosine, arabino-guanosine, arabino-inosine, L-arabino-cytidine, L-arabino-uridine, L-arabino-adenosine, L-arabino-guanosine, L-arabino-inosine, ribo-thymidine, arabino-thymidine, L-ribo-thymidine, and L-arabino-thymidine.

27. A method for synthesizing a 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl-N4-acyl cytidine 3'-O-(2-cyanoethyl-N,N-diisopropylphosphoramidite), comprising:

a) acylating the N^4 position of cytidine with an acylating agent;

b) introducing a 5',3'-cyclic silyl protecting group to the product of (a);

c) introducing a 2'-O-triisopropylsilyloxymethyl protecting group to the product of (b);

d) deprotecting the product from (c) with a source of fluoride ion under conditions suitable for the isolation of 2'-O-triisopropylsilyloxymethyl-N4-acyl cytidine;

e) introducing a dimethoxytrityl group at the 5'-position of the product from (d) under conditions suitable for obtaining 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl-N4-acyl cytidine; and

f) introducing a phosphoramidite group at the 3'-position of the product from (e) with a phosphitlylating reagent under conditions suitable for obtaining said 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl-N4-acyl cytidine 3'-O-(2-cyanoethyl-N,N-diisopropylphosphoramidite).

28. A method for synthesizing a 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl-N4-acyl cytidine 3'-O-(2-cyanoethyl-N,N-diisopropylphosphoramidite), comprising:

a) introducing a 5',3'-cyclic silyl protecting group to cytidine;

b) introducing a 2'-O-triisopropylsilyloxymethyl protecting group to the product of (b);

c) acylating the N^4 position of the product of (b) with an acylating agent ;

d) deprotecting the product from (c) with a source of fluoride ion under conditions suitable for the isolation of 2'-O-triisopropylsilyloxymethyl-N4-acyl cytidine;

e) introducing a dimethoxytrityl group at the 5'-position of the product from (d) under conditions suitable for obtaining 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl-N4-acyl cytidine; and

f) introducing a phosphoramidite group at the 3'-position of the product from (e) with a phosphitlylating reagent under conditions suitable for obtaining said 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl-N4-acyl cytidine 3'-O-(2-cyanoethyl-N,N-diisopropylphosphoramidite).

29. A method for synthesizing a 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl uridine 3'-O-(2-cyanoethyl-N,N-diisopropylphosphoramidite), comprising:

a) introducing a 5',3'-cyclic silyl protecting group to uridine;

b) introducing a 2'-O-triisopropylsilyloxymethyl protecting group to the product of (b);

c) deprotecting the product from (b) with a source of fluoride ion under conditions suitable for the isolation of 2'-O-triisopropylsilyloxymethyl uridine;

d) introducing a dimethoxytrityl group at the 5'-position of the product from (c) under conditions suitable for obtaining 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl uridine; and

e) introducing a phosphoramidite group at the 3'-position of the product from (d) with a phosphitlylating reagent under conditions suitable for obtaining said 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl uridine 3'-O-(2-cyanoethyl-N,N-diisopropylphosphoramidite).

30. A method for synthesizing a 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl-N6-acyl adenosine 3'-O-(2-cyanoethyl-N,N-diisopropylphosphoramidite), comprising:

a) introducing a 5',3'-cyclic silyl protecting group to adenosine;

b) introducing a 2'-O-triisopropylsilyloxymethyl protecting group to the product of (b);

c) acylating the N6 position of the product of (b) with an acylating agent ;

d) deprotecting the product from (c) with a source of fluoride ion under conditions suitable for the isolation of 2'-O-triisopropylsilyloxymethyl-N6-acyl adenosine;

e) introducing a dimethoxytrityl group at the 5'-position of the product from (d) under conditions suitable for obtaining 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl-N6-acyl adenosine; and

f) introducing a phosphoramidite group at the 3'-position of the product from (e) with a phosphitlylating reagent under conditions suitable for obtaining said 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl-N6-acyl adenosine 3'-O-(2-cyanoethyl-N,N-diisopropylphosphoramidite).

31. A method for synthesizing a 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl-N2-acyl guanosine 3'-O-(2-cyanoethyl-N,N-diisopropylphosphoramidite), comprising:

a) introducing a 5',3'-cyclic silyl protecting group to guanosine;

b) introducing a 2'-O-triisopropylsilyloxymethyl protecting group to the product of (b);

c) acylating the N2 position of the product of (b) with an acylating agent ;

d) deprotecting the product from (c) with a source of fluoride ion under conditions suitable for the isolation of 2'-O-triisopropylsilyloxymethyl-N2-acyl guanosine;

e) introducing a dimethoxytrityl group at the 5'-position of the product from (d) under conditions suitable for obtaining 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl-N2-acyl guanosine; and

f) introducing a phosphoramidite group at the 3'-position of the product from (e) with a phosphitlylating reagent under conditions suitable for obtaining said 5'-O-dimethoxytrityl-2'-O-triisopropylsilyloxymethyl-N2-acyl guanosine 3'-O-(2-cyanoethyl-N,N-diisopropylphosphoramidite).

32. The method of claim 27, wherein said acyl group is an acetyl group.

33. The method of claim 28, wherein said acyl group is an acetyl group.

34. The method of claim 30, wherein said acyl group is a benzoyl group.

35. The method of claim 31, wherein said acyl group is an isobutyryl group.

36. The method of claim 27, wherein said 5',3'-cyclic silyl protecting group is a 5',3'-O-(di-alkylsilanediyl) group.

37. The method of claim 28, wherein said 5',3'-cyclic silyl protecting group is a 5',3'-O-(di-alkylsilanediyl) group.

38. The method of claim 29, wherein said 5',3'-cyclic silyl protecting group is a 5',3'-O-(di-alkylsilanediyl) group.

39. The method of claim 30, wherein said 5',3'-cyclic silyl protecting group is a 5',3'-O-(di-alkylsilanediyl) group.

40. The method of claim 31, wherein said 5',3'-cyclic silyl protecting group is a 5',3'-O-(di-alkylsilanediyl) group.

41. The method of claim 36 wherein said 5',3'-O-(di-alkylsilanediyl) group is a 5',3'-O-di-tert-butylsilanediyl group.

42. The method of claim 37 wherein said 5',3'-O-(di-alkylsilanediyl) group is a 5',3'-O-di-tert-butylsilanediyl group.

43. The method of claim 38 wherein said 5',3'-O-(di-alkylsilanediyl) group is a 5',3'-O-di-tert-butylsilanediyl group.

44. The method of claim 39 wherein said 5',3'-O-(di-alkylsilanediyl) group is a 5',3'-O-di-tert-butylsilanediyl group.

45. The method of claim 40 wherein said 5',3'-O-(di-alkylsilanediyl) group is a 5',3'-O-di-tert-butylsilanediyl group.